

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK**

SECURITIES AND EXCHANGE
COMMISSION,

Plaintiff,

v.

TERRAFORM LABS, PTE. LTD. and DO
HYEONG KWON,

Defendants.

Civil Action No. 23 Civ. 1346 (JSR)

Hon. Jed S. Rakoff

**REPLY MEMORANDUM OF LAW IN FURTHER SUPPORT OF DEFENDANTS'
MOTION TO EXCLUDE THE OPINIONS OF PROF. BRUCE MIZRACH**

Defendants¹ respectfully submit this reply memorandum of law in further support of their motion to exclude the opinions of Prof. Bruce Mizrach that have been offered by the SEC.

INTRODUCTION

The SEC concedes that it offers Prof. Mizrach's opinions to support its allegation that the Trading Firm's trading was the sole cause of the May 2021 repeg. Opp. 2. It is thus remarkable that the SEC tries to defend Prof. Mizrach's price impact model, but says nothing to try to defend his opinions about the but-for price of UST absent the Trading Firm's trades, the operation of the mint/burn mechanism, or what caused the May 2021 repeg. Because Defendants demonstrated that the latter opinions are inadmissible (Br. 3-8; Br. Ex. A, Hendershott Report ¶¶ 52-59) and the SEC does not respond, it has conceded that Prof. Mizrach's opinions about but-for prices and the cause of the repeg must be excluded.² Indeed, the SEC's attempted defense of Prof. Mizrach's opinions amounts to the argument that every regression model is admissible because regressions are standard tools. That is not the law: Courts regularly strike improperly constructed regression models.³

ARGUMENT

I. PROF. MIZRACH'S OPINIONS ARE UNRELIABLE⁴

The SEC argues that Defendants misunderstand how courts act as gatekeepers under *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993) and Fed. R. Evid. 702 (Opp. 5-7).

¹ Capitalized terms not defined herein have the meanings set forth in the Memorandum of Law in Support of Defendants' Motion to Exclude The Opinions of Prof. Bruce Mizrach (ECF No. 96, "Br."). Citations to the Memorandum of Law In Opposition to Defendants' Motion to Exclude The Opinions and Testimony of Prof. Bruce Mizrach (ECF No. 112) are in the form "Opp. xx."

² See, e.g., *Devito v. Smithkline Beecham Corp.*, 02 Civ. 745, 2004 WL 3691343, at *3 (N.D.N.Y. Nov. 29, 2004) (plaintiff's failure to respond to an "aspect" of defendant's motion to exclude expert testimony was "a concession by plaintiff that the court should exclude [the expert's] testimony" on that ground); *Koehler v. Bank of Bermuda (New York) Ltd.*, No. 96 Civ. 7885(JFK), 1998 WL 67652, at *8 (S.D.N.Y. February 19, 1998) ("the Court views Plaintiff's failure to oppose [defendant's motion to dismiss two counts] as an implicit concession to the relief sought ...").

³ See *City of Tuscaloosa v. Harcros Chemicals, Inc.*, 158 F.3d 548 (11th Cir. 1998); *American Booksellers Ass'n, Inc. v. Barnes & Noble, Inc.*, 135 F. Supp. 2d 1031, 1041 (N.D. Cal. 2001).

⁴ The SEC's complaints about Prof. Hendershott's declaration in support of this motion (Opp. 20-22) fail. First, Prof. Hendershott's declaration (Br. Ex. E, ECF No. 96-5) states what the SEC's Opposition actually concedes: That Prof. Mizrach's rebuttal report did nothing to remedy the flaws demonstrated in Prof. Hendershott's expert report because Prof. Mizrach thinks what

The SEC is wrong. As it concedes, “serious flaws in reasoning or methodology will warrant exclusion” (Opp. 7), and that is part of what *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997), means by there being “too great an analytical gap between the data and the opinion proffered” to permit admission.⁵ Contrary to the SEC’s assertions (Opp. 6), Defendants have not asked the Court to decide who is “better,” they have demonstrated—and the SEC and Prof. Mizrach do not refute—that Prof. Mizrach’s opinions suffer from deep conceptual and methodological flaws that put them beyond what *Daubert* permits.

A. Prof. Mizrach’s Proposed Methodology Is Conceptually Flawed

A conceptual flaw is not one expert “disagree[ing]” (Opp. 7) with another: Defendants demonstrated that the Hasbrouck model was designed to measure the information content of trades, not whether a price would have moved more or less if the trading being studied had not occurred (*see* Hendershott Report ¶¶ 65-71; Br. Ex. E-1 Hasbrouck, p. 183 & 185).⁶ Although the Hasbrouck methodology can be used to study what price changes the Trading Firm’s May 23, 2021 trading might have *predicted*, Prof. Mizrach tries to use it to determine what prices that trading *caused*, thus confusing correlation with causation (*see* Hendershott Report ¶¶ 66-69; Daniel L. Rubinfeld, *Reference Guide on Multiple Regression*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE: THIRD EDITION (2011) 305, 309 (“Rubinfeld”)). This goes directly to whether Prof. Mizrach’s methodology “is known to reach reliable results for the type of opinion

he did is right (*see, e.g.*, Opp. 9). *Second*, and for that reason, the Court need only consider Prof. Mizrach’s original report and Prof. Hendershott’s report in resolving this motion, rendering this part of the SEC’s Opposition moot.

⁵ One example of such a gap is the SEC’s insistence that Prof. Mizrach is right, and Prof. Hendershott is wrong, because Prof. Mizrach based his opinions on the assumption that the agreement for the Trading Firm to acquire LUNA was modified as the SEC alleges and Prof. Hendershott does not (Opp. 3-4). Prof. Mizrach admitted that was an assumption, and we now know that the SEC has submitted no admissible evidence to support its allegation (*see* Def’s Rule 56.1 Ctr. Stmt. ¶¶ 124, 129, 130, 131, 132, and 133; Br. Ex. B Mizrach Tr. 48:13-14, :17-19 (“these trades can be attributed to [U.S. Trading Firm]... [because U.S. Trading Firm] provided both sides of the litigation with their trading data”)). The SEC cannot ask the Court to admit opinions based on an assumption supported by *no* admissible evidence.

⁶ Defendants have cited the numbered exhibits attached to the Hendershott Declaration (Br. Ex. E) as Ex. E-xx.

the expert would expect to give.”⁷ Prof. Hendershott demonstrated analytically and empirically that Prof. Mizrach’s methodology cannot and does not reach reliable results.

The SEC’s response—that VARs and IRFs are “standard techniques that are commonly used by economists” (Opp. 7-8) does not engage with Defendants’ arguments. Prof. Hendershott will explain at the *Daubert* hearing why this is not a “difference of opinion” (Opp. 9), why the academic paper cited by the SEC (Opp. 8) does not negate the conceptual flaws he identified,⁸ and why his work in the CFTC case upon which the SEC so heavily relies (Opp. 8, 10-11) demonstrates precisely why Prof. Mizrach’s opinions are inadmissible for the reasons Prof. Hendershott explained in his report (*see* Hendershott Report ¶¶ 61-67).

Nor, contrary to the SEC’s assertion (Opp. 9), is Defendants’ motion based on Prof. Hendershott’s *ipse dixit*. It is based on detailed discussion of the Hasbrouck methodology itself and how it works, citations to peer-reviewed articles, and empirical analyses (which the SEC does not challenge) that identify massive errors caused by Prof. Mizrach’s mis-specification and mis-use of his model based on the Hasbrouck methodology (Br. 4, 10-13 and Hendershott Report ¶¶ 65-71, 110-121).⁹ It is true that *Daubert* allows for disagreements about methodology within certain limits, but the Court need not locate that line with precision because opinions whose results have an error rate of at least a factor of ten are on the wrong side of that line.¹⁰ That is

⁷ See Fed. R. Evid. 702, advisory committee notes to the 2000 amendments; *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 151 (1999).

⁸ Prof. Mizrach did not cite that paper in either of his reports. That the SEC cites it now is a clear admission that Prof. Mizrach did not adequately support his proposed opinions. Prof. Mizrach cited one paper (Hasbrouck), did not do what that paper specified, and provided no citations for why what he did do was scientifically valid. Citing a new paper now—that still does not support the proposed opinions—fixes nothing.

⁹ As discussed in Prof. Hendershott’s report, two of these errors separately cause ten-fold changes in Prof. Mizrach’s estimates, and at the hearing, Prof. Hendershott will be prepared to explain why looking at Prof. Mizrach’s individual error rates does not allow the calculation of a cumulative error rate.

¹⁰ See generally *U.S. v. White Horse*, 177 F. Supp. 2d 973, 975 (D.S.D. 2001) (24% false negative rate was too high); *Wade-Greaux v. Whitehall Labs, Inc.*, 874 F. Supp. 1441, 1480 (D.V.I. 1994) (because the scientific community generally understood that extrapolating from animal models to human experience had extraordinarily high rate of error and thus did not do such extrapolations, proposed opinions that did so did not satisfy *Daubert*). Dr. Mizrach’s analysis predicts that U.S. Trading Firm made 10 times more trades than it actually did, demonstrating an extremely large predictive error rate (Hendershott Report ¶ 11). In addition to the known error rate present in his predicted trade counts, Dr. Mizrach’s analyses rely on

especially so when they are the only evidence a party with the burden of proof offers to support a claim of fraud.

The SEC's argument that Defendants misunderstand Prof. Mizrach's economic models (Opp. 9-17) appear designed to obfuscate rather than illuminate. *First*, the SEC spends nearly two pages arguing that Prof. Mizrach's methodology is designed to determine price impact (Opp. 9-11). But what Prof. Hendershott explained is that *that is all it can do*, and it cannot establish a but-for price or causation of the May 2021 repeg (*see* Hendershott Report ¶¶ 65-71). This does nothing to address Defendants' arguments. And as noted above, the SEC misunderstands what Prof. Hendershott did in the *Sarao* case for the CFTC and, more importantly, what he did *not* do and *why* he did not do it. Prof. Hendershott will explain that at the hearing.

Second, the SEC argues that Prof. Mizrach's model does control for trading by other entities (Opp. 11-12). The SEC's primary argument just repeats Prof. Mizrach's claim that his mid-quotes capture all other trading, but Prof. Hendershott showed that is wrong (*see e.g.*, Hendershott Report ¶ 73). The SEC also argues that Defendants' analysis "does not make logical sense" because all of the Trading Firm's trades involved another party (Opp. 11). That argument is a dodge: The SEC does not deny that there were UST traders other than the Trading Firm, and Prof. Hendershott demonstrated that Prof. Mizrach's model did not control for them whether they traded with the Trading Firm or each other (Hendershott Report ¶ 73). The claimed symmetry of Prof. Mizrach's estimates (Opp. 12) is irrelevant for the same reasons, and this argument ignores the fact that no matter what happened during the 30 minutes in the morning of May 23, 2021, the price of UST declined substantially thereafter and rose when the Trading Firm was not actively trading at all (*see* Br., 7).

Third, the SEC asserts that "[m]uch of" the criticism of Prof. Mizrach is about how he categorized the Trading Firm's data (Opp. 12-16). That is wrong: Prof. Hendershott's primary

speculative assertions for which the error rate is unknown altogether. For example, Dr. Mizrach offers no scientific analysis at all on how "[his] analysis specifically takes into account how other market participants did and would have traded On May 23," (Br. Ex. D Mizrach Rebuttal Report, 5) beyond his speculation and assertion on the Trading Firm's "unique" incentives (Br. Ex. E Hendershott Decl. ¶ 8). Dr. Mizrach cannot even establish what the error rate would be for such speculative and unscientific opinions.

criticisms are that there are deep conceptual flaws in Prof. Mizrach's model; he then identified several specific methodological flaws, of which this was just one (*see* Hendershott Report ¶¶ 72-122). And the SEC does not even get this criticism right: It argues that this is just quibbling with Prof. Mizrach's choices about how to characterize a data set (Opp. 12), whereas Prof. Hendershott showed that the assumptions on which Prof. Mizrach based his decisions about how to analyze the data were empirically wrong, which led to economically non-sensical results (Hendershott Report ¶¶ 103-116 & 119-121),¹¹ and proposed opinions based on incorrect assumptions must be excluded, (*Bank of Am., N.A. v. Bear Stearns Asset Mgmt.*, 969 F. Supp. 2d 339, 358 (S.D.N.Y. 2013); *Johnson Elec. N. Am. Inc. v. Mabuchi Motor Am. Corp.*, 103 F. Supp. 2d 268, 284 (S.D.N.Y. 2000)). In short, this flaw goes to the reliability, and thus admissibility, of Prof. Mizrach's opinions, not their weight.¹²

Fourth, the SEC argues that Prof. Mizrach's use of calculated trade counts, instead of the Trading Firm's actual trade counts, is not a basis for exclusion (Opp. 16-17). The SEC's argument is an exercise in obfuscation. Yes, the Hasbrouck paper is one of the most cited in market microstructure, and Prof. Mizrach has published a paper applying the Hasbrouck technique. But that is where this interlude ends, because although Prof. Mizrach cited Hasbrouck and used that methodology in a different paper, he did not appropriately tailor the Hasbrouck methodology to the facts and circumstances of this case, and he did not provide justification for why what he did here should be considered methodologically valid, when it is not:

- Despite admitting that he is “not sure” that his imputed trade count “represents much of anything,” (Mizrach Tr. 103:2-104:2), Prof. Mizrach chose to create and use it in lieu of actual trade counts.¹³

¹¹ For example, Prof. Hendershott's report demonstrates that the buy/sell difference the SEC focuses on (Opp. 13) is irrelevant because only buys are associated with the bookstacker category in the trading data.

¹² The SEC again criticizes Prof. Hendershott for not constructing a model of his own (Opp. 13), but Prof. Hendershott did not need to do that. Defendants do not bear the burden of proof with respect to anything about which Prof. Mizrach seeks to opine, rebuttal experts are not required to construct their own models, and Prof. Hendershott was able to demonstrate the flaws in Prof. Mizrach's opinions using Prof. Mizrach's own model and data.

¹³ Prof. Mizrach's admission regarding his calculated trade count, on its own, nullifies his and the SEC's *post hoc* attempts to justify his methodological choice (Opp. 16-17).

- Prof. Mizrach’s methodology assumes that on average all buy and sell orders are the same size, which is empirically false.
- The effect of this error, on its own, is a ten-fold change in Prof. Mizrach’s estimates.

These issues go directly to admissibility (*see* Hendershott Report ¶¶ 119-120 and 122; Rubinfeld at 317; *Bricklayers & Trowel Trades Int’l Pension Fund v. Credit Suisse Sec. (USA) LLC*, 752 F.3d 82, 89 (1st Cir. 2014)).

B. Prof. Mizrach Failed to “Sanity Test” His Economic Modeling Against Actual Real-World Data

The SEC’s arguments on this issue are hard to understand in light of the fact that courts addressing *Daubert* motions must evaluate “[w]hether the expert has adequately accounted for obvious alternative explanations” (Fed. R. Evid. 702, advisory committee notes to the 2000 amendments). This is precisely the point of Defendants’ “sanity test” discussion.

First, there is no irony (Opp. 17) here because every supposed “fact” the SEC claims Prof. Hendershott ignored lacks admissible evidence supporting it (*see supra* 2-4). In any event, Prof. Hendershott’s criticisms mostly do not relate to those supposed “facts” and are directed at the interplay between Prof. Mizrach’s model results and the actual price behavior of UST in May 2021. Indeed, Prof. Mizrach’s core opinion that the Trading Firm was the sole cause of the May 2021 repeg has nothing to do with motivations, it is an exercise in data analysis that can be checked against real-world data to see if it makes sense. And when it is checked against that data, it does *not* make sense.

Second, at their core, Prof. Mizrach’s opinions are based on the assumption that the Trading Firm was the only net buyer of UST during the May 2021 depeg, and there is simply no admissible evidence that that was the case. Put differently, the assumption that there was no buyer other than the Trading Firm is equivalent to assuming that a full depeg would have occurred but for the Trading Firm’s purchases, so Prof. Mizrach assumed what he was trying to prove.

Third, the SEC’s attempt to explain away Prof. Mizrach’s nonsensical results actually make its problems worse: The SEC argues that Prof. Mizrach’s calculated \$0.62 price impact when the price of UST only rose \$0.03 makes sense because Prof. Mizrach was measuring “what

the price would have been if [the Trading Firm] was *not* purchasing the UST being sold.” (Opp. 18-19, emphasis in original). In other words, Prof. Mizrach’s results supposedly make sense because he was generating a but-for price using a methodology which, as the SEC has already conceded, that methodology cannot do. This attempted defense reinforces the need to exclude Prof. Mizrach’s opinions.

II. PROF. MIZRACH’S TESTIMONY IS NOT RELEVANT TO THE ISSUES IN THIS CASE BECAUSE HE HAS NO BASIS TO CLAIM THAT THE MAY 2022 DE-PEGGING EVENT SERVES AS “VALIDATION” THAT THE TRADING FIRM’S TRADING CAUSED THE 2021 RE-PEGGING

The SEC’s complaint about the length of Prof. Hendershott’s analysis of the May 2022 depeg (Opp. 19-20) compels the exclusion of part 2 of Prof. Mizrach’s opinions for three reasons. *First*, the SEC admits that he is not offering any opinions about the May 2022 depeg.¹⁴ *Second*, that Prof. Mizrach offered opinions about the May 2021 depeg supported by “two sentences” (Opp. 19) about the May 2022 depeg, compared to Prof. Hendershott’s nearly 25 page analysis (Hendershott Report ¶¶ 134-158) tells the Court all it needs to know about the level of scientific rigor applied by Prof. Mizrach; as the SEC concedes, whether the level of rigor established in the relevant field was applied by a proposed expert is one of the Daubert factors (Opp. 7-8). *Third*, the SEC’s purported inability to understand “what Defendants are referring to” (Opp. 19 n.7) is yet another concession: The SEC admits that the portions of Prof. Mizrach’s report at issue depend on the assumed agreement for which there is no admissible evidence (*id.*), which (a) confirms that Prof. Mizrach is reciting assumptions rather than offering an opinion and (b) provides a *separate* reason to exclude that part of his report (it has no basis in admissible evidence).

¹⁴ *E.g.*, Opp. 19 (“Dr. Mizrach’s Testimony is About the May 2021 Depeg”); *see also Mercurio v. Nissan Motor Corp.*, 81 F. Supp. 2d 859, 863 (N.D. Ohio 2000) (“[I]t appears that Dr. Moskowitz will do little more than regurgitate the conclusions of several journal articles he has read. If that is all Dr. Moskowitz intends to do, it will not pass muster under *Daubert*.”).

CONCLUSION

For all of the foregoing reasons and those set forth in Defendants' opening brief, the Court should exclude the opinions of Prof. Mizrach.

Dated: November 10, 2023

Respectfully submitted,

By: /s/ Douglas W. Henkin

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CERTIFICATE OF SERVICE

I, Douglas W. Henkin, certify that I caused a true and correct copy of the foregoing to be served on all counsel of record via the Court's ECF system on November 10, 2023.

/s/ Douglas W. Henkin
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